

Association of Pre-Operative Platelet Counts with Serum CA-125 Levels in Patients with Epithelial Ovarian Carcinoma: A Cross-Sectional Study

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Abstract:

Background: Epithelial ovarian cancer remains one of the leading causes of gynecological malignancy-related mortality worldwide, often diagnosed at an advanced stage due to nonspecific symptoms. Biomarkers such as Cancer Antigen-125 (CA-125) and hematological parameters like platelet count have been studied individually as prognostic factors. The possible correlation between elevated platelet counts and serum CA-125 levels offers potential insight into tumor biology and patient stratification.

Objectives:

- To evaluate the pre-operative platelet counts in patients diagnosed with epithelial ovarian carcinoma.
- To analyze the correlation between platelet counts and serum CA-125 levels.

Methods: This cross-sectional observational study was conducted jointly by the Department of Obstetrics and Gynaecology, Katihar Medical College and Hospital, Katihar, Bihar, and the Department of Pathology, GMCH, Purnia, Bihar, India for 12 months included patients with histopathologically confirmed epithelial ovarian cancer who underwent surgical intervention. Pre-operative platelet counts and serum CA-125 levels were recorded. Statistical analysis was performed using SPSS version 22. Pearson's correlation coefficient was calculated to determine the relationship between platelet counts and CA-125 levels.

Results: The study observed that a significant proportion of patients exhibited thrombocytosis pre-operatively. A positive correlation was found between elevated platelet counts and higher serum CA-125 levels, suggesting that thrombocytosis may reflect increased tumor burden and aggressive disease biology.

Conclusion: Pre-operative thrombocytosis correlates positively with elevated CA-125 levels in epithelial ovarian cancer patients. Combined evaluation of hematological and tumor markers may enhance risk stratification, prognostic evaluation, and personalized treatment planning.

Keywords: Epithelial Ovarian Cancer, Platelet Count, CA-125, Thrombocytosis, Prognostic Biomarkers.

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Introduction

Epithelial ovarian cancer represents the most lethal gynecologic malignancy worldwide, primarily due to its asymptomatic nature in early stages and consequent diagnosis at advanced disease stages. Despite advances in surgical techniques and chemotherapeutic regimens, the prognosis of ovarian cancer remains poor, with a five-year survival rate significantly lower compared to other gynecological cancers [1]. Traditional prognostic indicators include tumor stage, histological grade, residual disease after surgery, and serum tumor markers such as Cancer Antigen-125 (CA-125). Among these, CA-125 has been extensively utilized as a diagnostic and monitoring tool, although its specificity remains suboptimal due to elevation in various benign conditions [2].

Emerging evidence suggests that hematological parameters, particularly platelet counts, may serve as potential prognostic markers in epithelial ovarian carcinoma. Thrombocytosis, or an elevated platelet count, has been observed in association with various solid tumors, including ovarian cancer [3]. The proposed mechanisms involve tumor-induced cytokine production, particularly interleukin-6 (IL-6), leading to increased thrombopoiesis. Elevated platelet counts may promote tumor progression through facilitation of angiogenesis, protection of circulating tumor cells from immune clearance, and enhancement of tumor cell adhesion and metastasis [4].

Several studies have reported that pre-operative thrombocytosis correlates with advanced disease stage, suboptimal surgical debulking,

chemoresistance, and reduced overall survival in ovarian cancer patients [5]. Parallel elevation of CA-125 and platelet counts may reflect a higher tumor burden and more aggressive biological behavior. Given the routine availability and low cost of complete blood counts, platelet count assessment offers a simple, inexpensive adjunct to traditional tumor markers for pre-operative risk stratification and prognostic evaluation [6].

Despite these observations, the correlation between pre-operative platelet counts and CA-125 levels has not been extensively studied in Indian populations, particularly in resource-constrained settings where advanced diagnostic modalities may be limited. Understanding this relationship could contribute to better patient stratification, individualized treatment planning, and potentially improved clinical outcomes [7].

In this context, the present study was undertaken to evaluate pre-operative platelet counts in patients diagnosed with epithelial ovarian cancer and to analyze the correlation between platelet counts and serum CA-125 levels. By elucidating this relationship, the study aims to reinforce the role of simple hematological parameters as valuable adjuncts in the management of epithelial ovarian carcinoma.

Methodology

This cross-sectional observational study was conducted jointly by the Department of Obstetrics and Gynaecology, Katihar Medical College and Hospital, Katihar, Bihar, and the Department of Pathology, GMCH, Purnia, Bihar, India for 12 months. The study population included women who were admitted for surgical management of suspected ovarian tumors and subsequently confirmed to have epithelial ovarian carcinoma based on histopathological examination. Informed consent was obtained from all participants.

Inclusion criteria encompassed adult female patients aged 18 years and above, diagnosed with epithelial ovarian carcinoma who had undergone pre-operative complete blood counts and serum CA-125 measurements. Exclusion criteria included patients with known hematological disorders, active infections, autoimmune diseases, other malignancies, or those receiving medications that

could independently alter platelet counts, such as corticosteroids or thrombopoietic agents.

Detailed clinical histories, including demographic data, presenting symptoms, menstrual and reproductive history, and comorbid conditions were recorded. Pre-operative laboratory investigations were reviewed, focusing on complete blood counts to determine platelet levels and serum CA-125 estimations performed by chemiluminescent immunoassay technique. Platelet counts greater than 400,000/mm³ were considered indicative of thrombocytosis as per standard hematological reference ranges.

Following surgical intervention, histopathological confirmation of epithelial ovarian carcinoma was obtained. For the purposes of correlation analysis, platelet counts and CA-125 values measured within two weeks prior to surgery were considered. Care was taken to ensure that samples were processed using standardized laboratory protocols to minimize pre-analytical variability.

Data were compiled systematically and analyzed using Statistical Package for the Social Sciences (SPSS) version 22. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. The Pearson correlation coefficient was used to assess the relationship between pre-operative platelet counts and serum CA-125 levels. A p-value less than 0.05 was considered statistically significant for all analyses.

Results

A total of 70 patients with histopathologically confirmed epithelial ovarian carcinoma were enrolled in the study. The mean age of the patients was 52.3 years, with the majority presenting in the postmenopausal period. Pre-operatively, 28.6% of patients exhibited thrombocytosis, and elevated serum CA-125 levels were noted in 85.7% of cases. A positive correlation was observed between higher platelet counts and increased serum CA-125 levels. Patients with thrombocytosis were more likely to have advanced stage disease and higher tumor burden. The findings suggest that platelet count, alongside CA-125, could serve as a simple adjunct marker for risk stratification in epithelial ovarian cancer.

Table 1: Age Distribution of Patients

Age Group (years)	Number (n=70)	Percentage (%)
<40	12	17.1%
40–59	38	54.3%
≥60	20	28.6%

Table 2: Menopausal Status

Menopausal Status	Number (n=70)	Percentage (%)
Premenopausal	28	40.0%
Postmenopausal	42	60.0%

Table 3: Presenting Symptoms

Symptom	Number (n=70)	Percentage (%)
Abdominal Distension	46	65.7%
Abdominal Pain	38	54.3%
Gastrointestinal Symptoms	22	31.4%
Urinary Symptoms	16	22.9%

Table 4: FIGO Stage Distribution

Stage	Number (n=70)	Percentage (%)
I–II	20	28.6%
III–IV	50	71.4%

Table 5: Histological Subtypes

Subtype	Number (n=70)	Percentage (%)
Serous	44	62.9%
Mucinous	14	20.0%
Endometrioid	8	11.4%
Clear Cell	4	5.7%

Table 6: Pre-Operative Platelet Count Distribution

Platelet Count (cells/mm ³)	Number (n=70)	Percentage (%)
≤400,000	50	71.4%
>400,000 (Thrombocytosis)	20	28.6%

Table 7: Pre-Operative Serum CA-125 Levels

CA-125 Level (U/mL)	Number (n=70)	Percentage (%)
≤35	10	14.3%
>35	60	85.7%

Table 8: Thrombocytosis and Tumor Stage Association

Thrombocytosis Status	Early Stage (I–II)	Advanced Stage (III–IV)	p-value
Present	2	18	0.001
Absent	18	32	

Table 9: Thrombocytosis vs. Elevated CA-125

Thrombocytosis Status	Elevated CA-125 Present (n=60)	Elevated CA-125 Absent (n=10)	p-value
Present	20	0	0.015
Absent	40	10	

Table 10: Pearson Correlation Analysis

Variable Pair	Pearson Correlation Coefficient (r)	p-value
Platelet Count and CA-125 Levels	+0.452	0.002

Table 11: Mean Serum CA-125 Levels

Thrombocytosis Status	Mean CA-125 (U/mL) ± SD
Present	850.4 ± 220.3
Absent	540.7 ± 180.5

Table 12: Predictive Value of Thrombocytosis for Advanced Disease

Parameter	Value (%)
Sensitivity	36.0%
Specificity	90.0%
Positive Predictive Value	90.0%
Negative Predictive Value	36.0%

Summary of Tables: The majority of epithelial ovarian carcinoma patients were in the 40–59 years age group and postmenopausal (Table 1, Table 2).

Abdominal distension and pain were the predominant presenting symptoms (Table 3). A significant proportion of patients presented in

advanced FIGO stages III–IV (Table 4), with serous carcinoma being the most common histological subtype (Table 5). Thrombocytosis was observed in 28.6% of patients pre-operatively (Table 6), and elevated serum CA-125 levels were found in 85.7% (Table 7). Thrombocytosis was significantly associated with advanced stage disease and elevated CA-125 levels (Table 8, Table 9). A positive moderate correlation was established between platelet count and CA-125 levels (Table 10), and mean CA-125 levels were higher among patients with thrombocytosis (Table 11). Although thrombocytosis had low sensitivity, it demonstrated high specificity for predicting advanced disease (Table 12).

Discussion

The present study reaffirms the potential significance of pre-operative hematological parameters, particularly platelet counts, in the prognostic evaluation of epithelial ovarian carcinoma. A substantial proportion of patients exhibited pre-operative thrombocytosis, and a strong association was observed between elevated platelet counts and advanced stage disease [8]. These findings are consistent with earlier studies that have identified thrombocytosis as an independent predictor of poor prognosis, increased tumor burden, and suboptimal surgical outcomes in ovarian cancer [9]. The biological plausibility lies in tumor-driven thrombopoiesis, mediated by inflammatory cytokines such as interleukin-6, which not only enhances platelet production but also facilitates tumor progression by promoting angiogenesis, immune evasion, and metastatic potential [10].

The study further demonstrated that serum CA-125 levels were elevated in the majority of patients, consistent with its established role as a tumor marker for ovarian malignancy. More importantly, a significant positive correlation between platelet counts and CA-125 levels was observed, suggesting that these two readily available markers may reflect common underlying pathological processes such as tumor aggressiveness, inflammatory activity, and vascular remodeling. The mean CA-125 levels were notably higher in patients with thrombocytosis, reinforcing the hypothesis that thrombocytosis may serve as a surrogate marker for higher tumor burden [11,12].

While thrombocytosis showed high specificity for predicting advanced disease, its relatively low sensitivity indicates that while the presence of thrombocytosis may reliably identify high-risk patients, its absence does not rule out aggressive disease [13]. Therefore, platelet count assessment should be considered as an adjunct rather than a replacement for conventional staging and biomarker evaluation. The combination of platelet counts with

serum CA-125 measurements could enhance pre-operative risk stratification, guide surgical planning, and inform decisions regarding neoadjuvant chemotherapy in selected cases [14].

The strengths of this study include its focus on a simple, cost-effective, and routinely available hematological parameter that can complement existing tumor markers without additional financial burden. However, certain limitations must be acknowledged. The cross-sectional nature of the study precludes assessment of causal relationships or longitudinal outcomes such as recurrence and survival. Additionally, confounding factors such as subclinical infections or inflammatory conditions that could influence platelet counts were minimized through careful exclusion criteria but cannot be entirely ruled out. A relatively modest sample size and single-center design may also limit the generalizability of findings.

Despite these limitations, the study highlights the clinical utility of integrating platelet count assessment with CA-125 measurements in the pre-operative evaluation of epithelial ovarian cancer. Future prospective studies with larger cohorts and longitudinal follow-up are warranted to validate these findings and explore the prognostic impact of dynamic changes in platelet counts and CA-125 levels during and after treatment.

Conclusion

This study emphasizes that pre-operative thrombocytosis is a common hematological finding among patients with epithelial ovarian carcinoma and is significantly associated with elevated serum CA-125 levels and advanced stage disease. The positive correlation between platelet counts and CA-125 concentrations suggests that these markers may reflect shared pathological mechanisms involving tumor burden and inflammatory activation. Although thrombocytosis demonstrated high specificity for predicting advanced disease, its limited sensitivity necessitates its use as an adjunct rather than a standalone predictive tool. Incorporating pre-operative platelet count assessment alongside CA-125 evaluation can enhance risk stratification, surgical planning, and early identification of patients requiring intensive management. Routine evaluation of hematological parameters, which are inexpensive and widely available, can thus complement tumor markers to provide a more comprehensive pre-operative assessment. Despite the study's limitations, including its cross-sectional design and modest sample size, the findings underscore the potential utility of platelet counts as a valuable adjunctive biomarker. Future multicenter prospective studies with larger patient cohorts and longitudinal follow-up are needed to validate these observations and explore their implications for survival outcomes.

Overall, integration of hematological and tumor marker profiles could lead to more individualized and effective management strategies in epithelial ovarian cancer care.

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